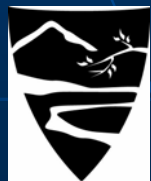


State of Global Fisheries and Implications for Human Nutrition



Larry B. Crowder
Duke Center for Marine Conservation
Nicholas School of the Environment and Earth Sciences



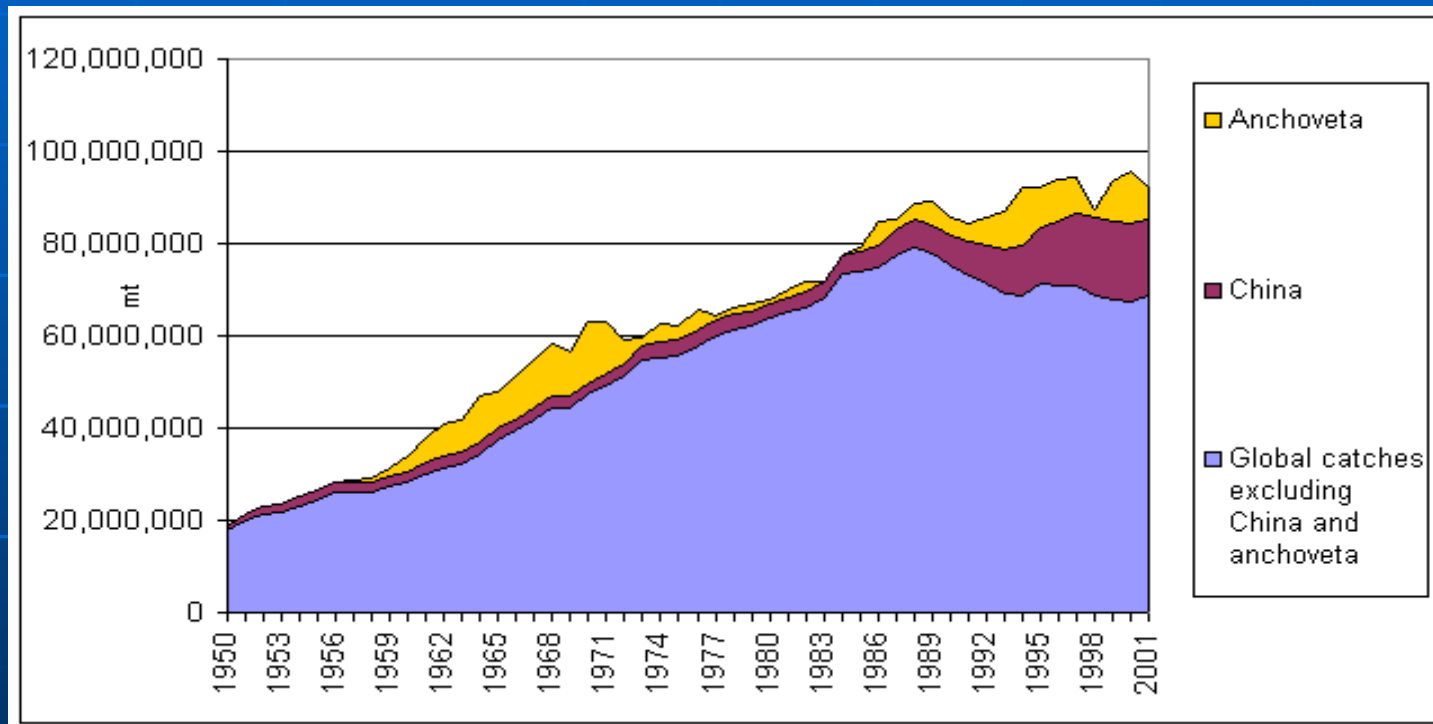


I believe that the cod fishery, the herring fishery, the pilchard fishery, the mackerel fishery, and probably all the great sea-fisheries are inexhaustible; that is to say, nothing we can do seriously affects the number of fish.

Thomas Huxley
1825-95

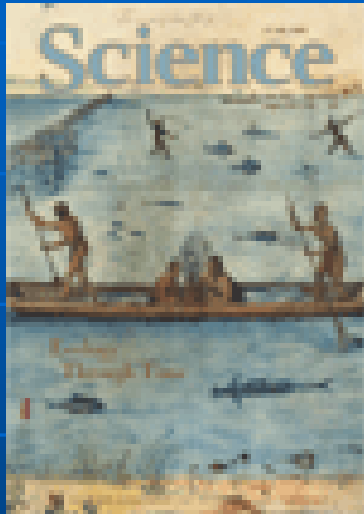


Status of Global Fisheries

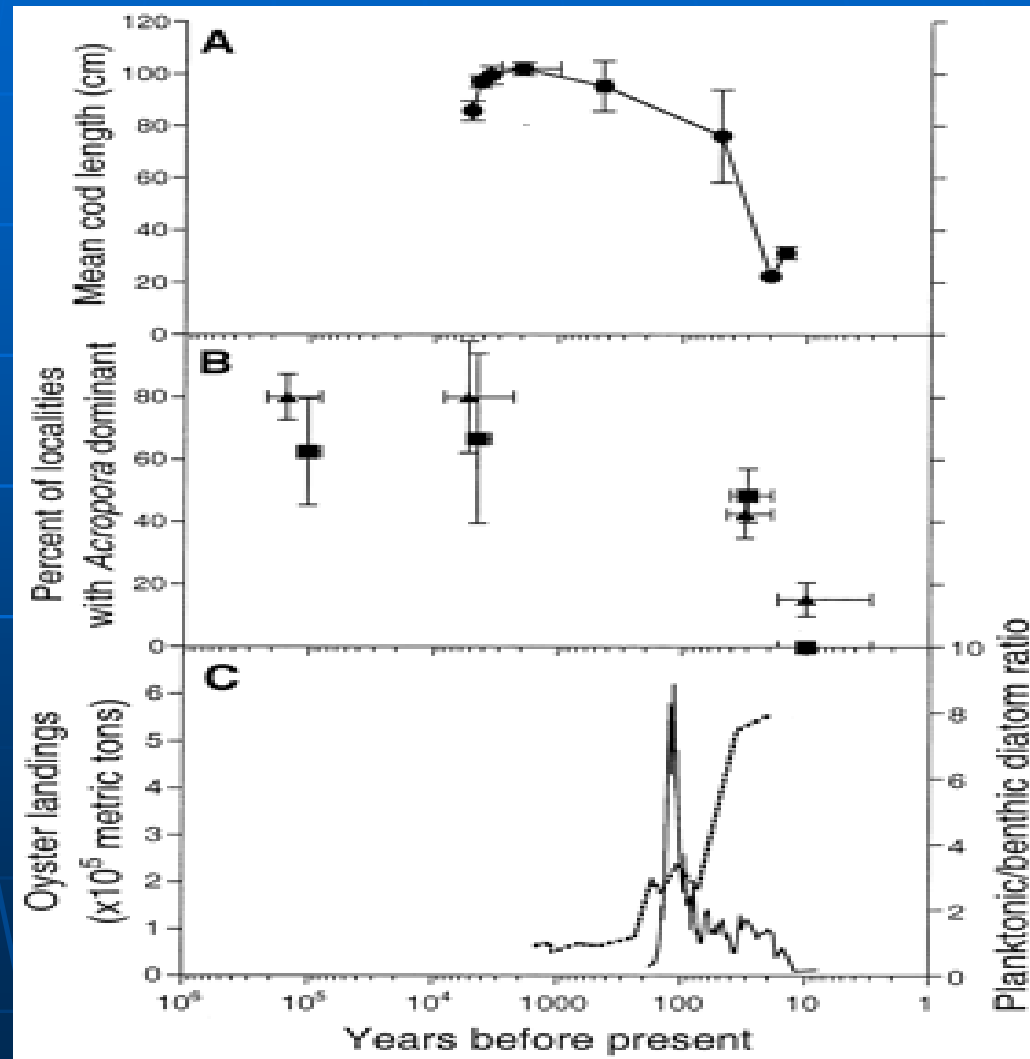


<http://www.fao.org/fi/statist/snapshot/01vs00/01vs00.asp>

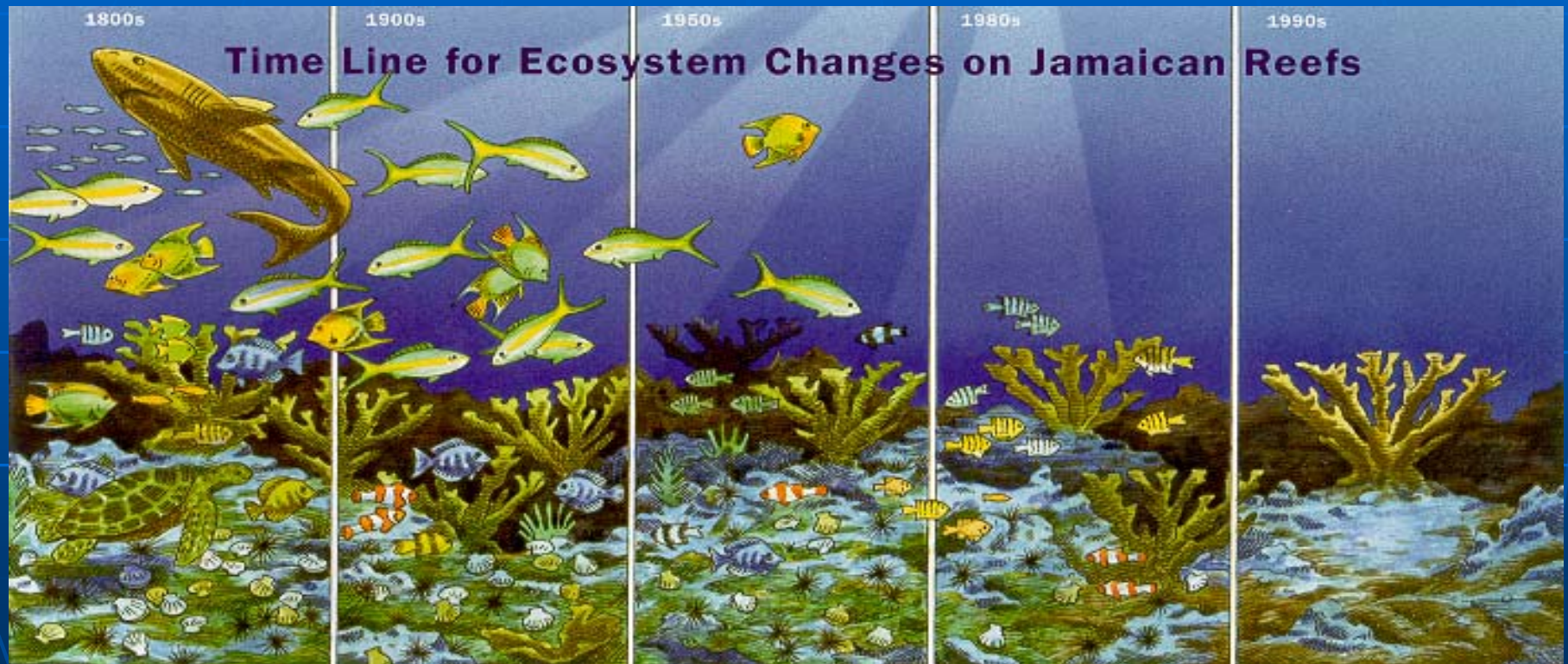
Historical overfishing in marine systems



Jackson et al.
2001. Science



Coral Reef Ecosystems



The Sliding Baseline Syndrome

“...each generation of fisheries scientists accepts as a baseline the stock size and species composition that occurred at the beginning of their careers and uses this to evaluate changes.”

Pauly (1995) TREE 10:430

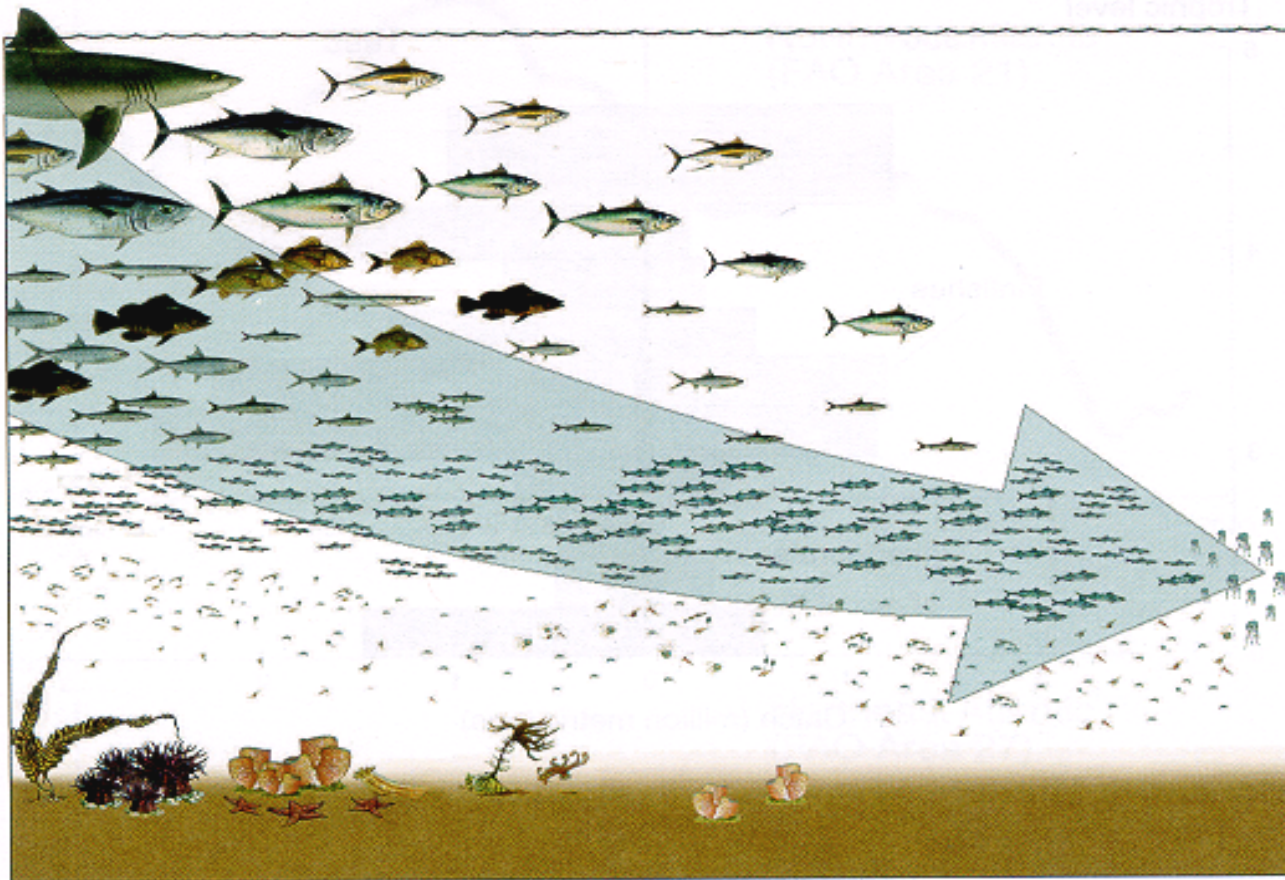


FIGURE 17. FISHING DOWN: WHAT IT ACTUALLY MEANS.

Fishing down marine food webs means that the fisheries (blue arrow), having at first removed the larger fishes at the top of various food chains, must target fishes lower and lower down, and end up targeting very small fishes and plankton, including jellyfish.

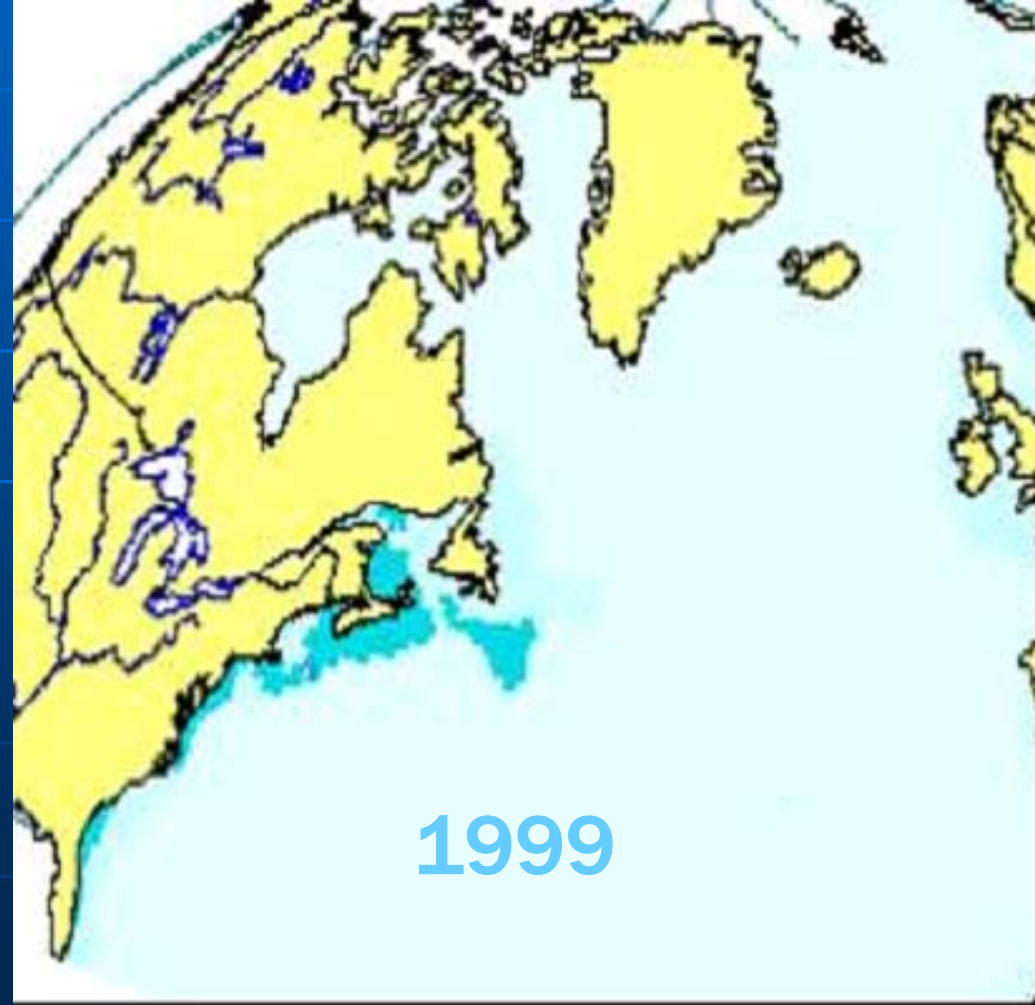
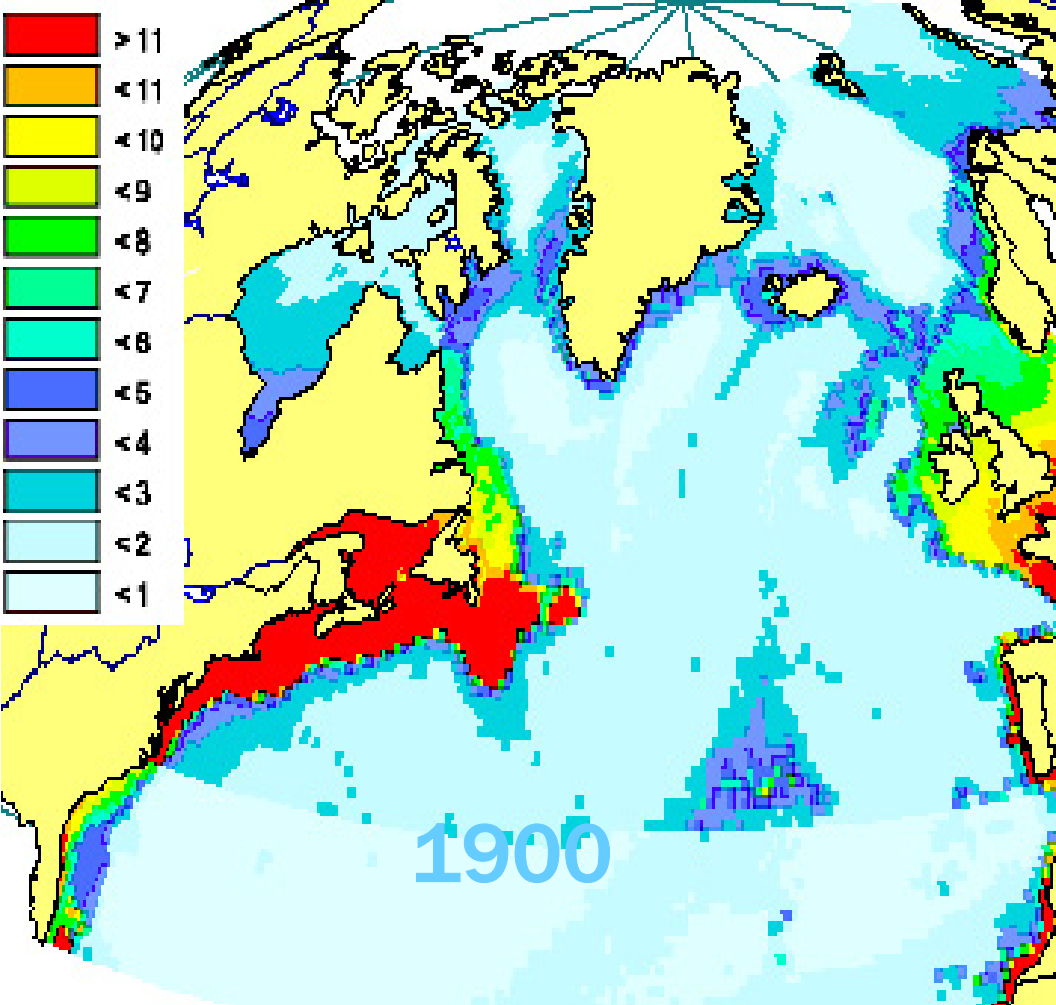
Fishing down marine
food webs in the
North Atlantic

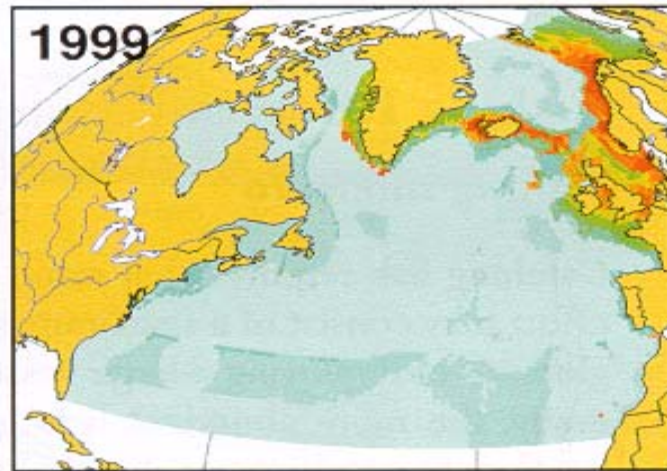
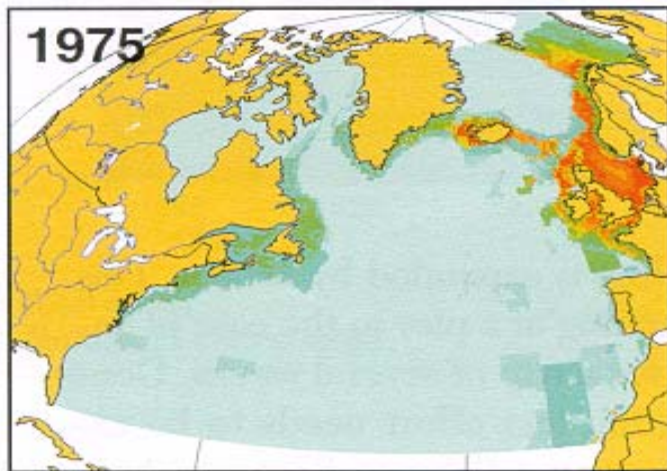
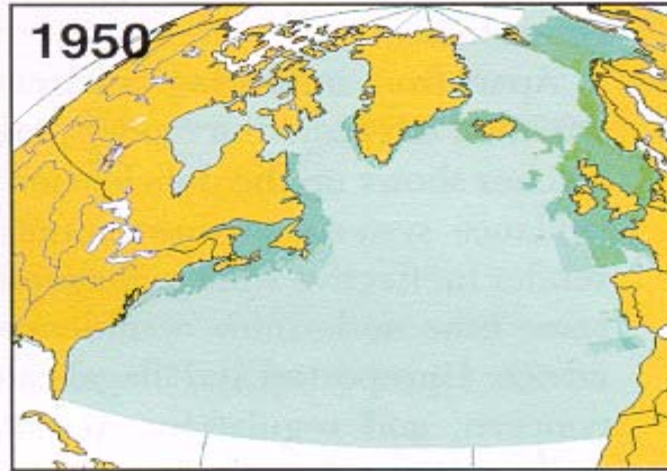
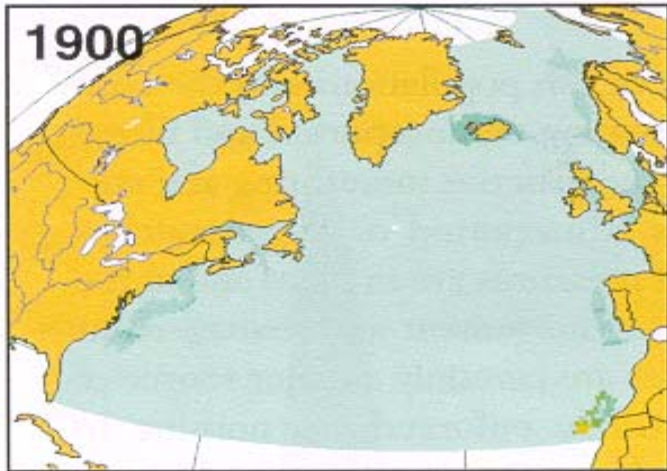
Pauly & Maclean (2003)



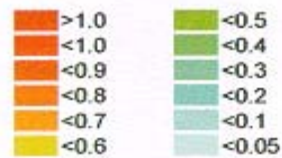
North Atlantic Fish Biomass Shrinks

D. Pauly and J. McLean (2003)
In a Perfect Ocean





Fishing intensity (catch/biomass)



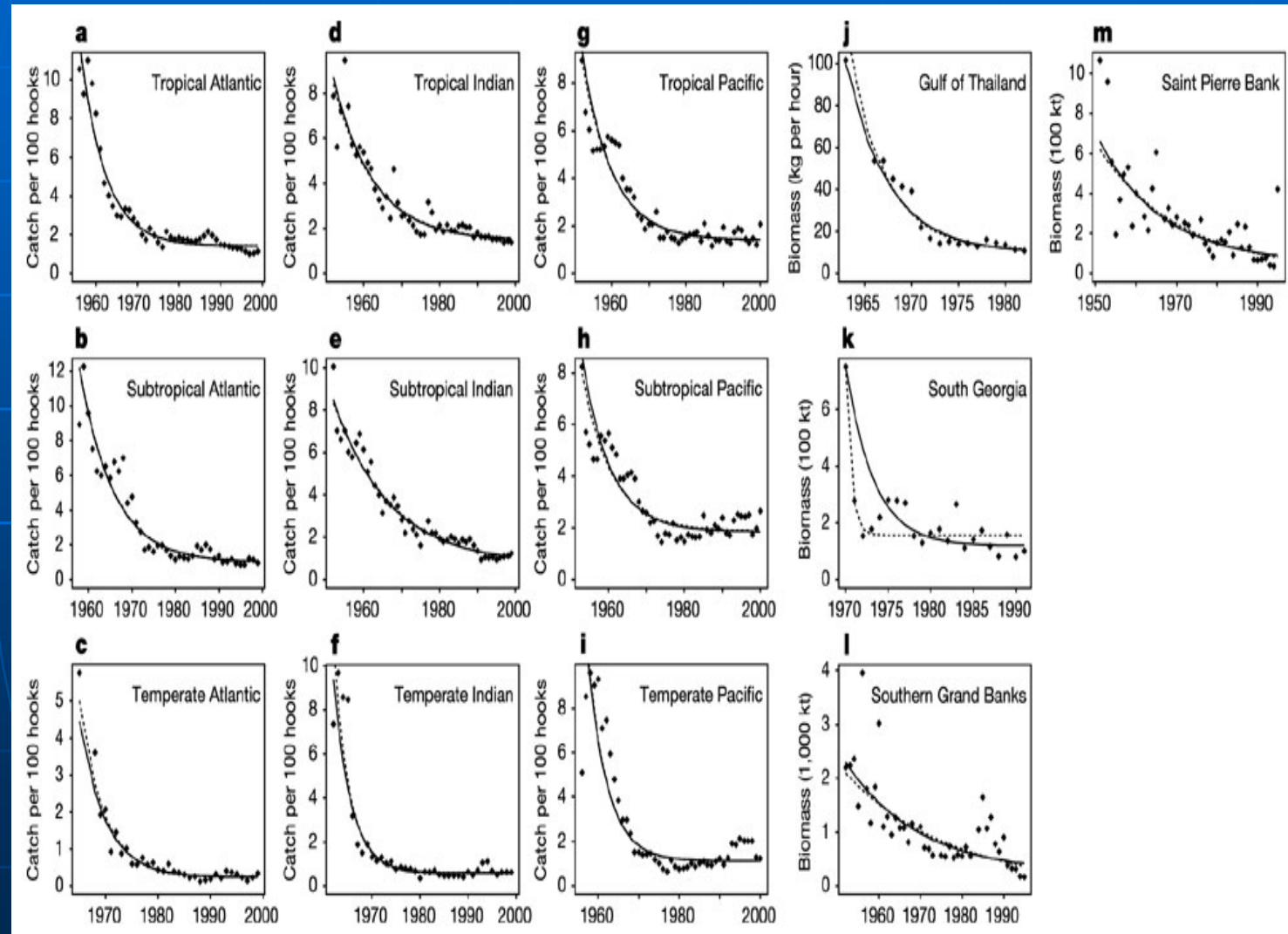
Fishing *intensity*
(catch/biomass) for
higher trophic level
species

Pauly & Maclean (2003)

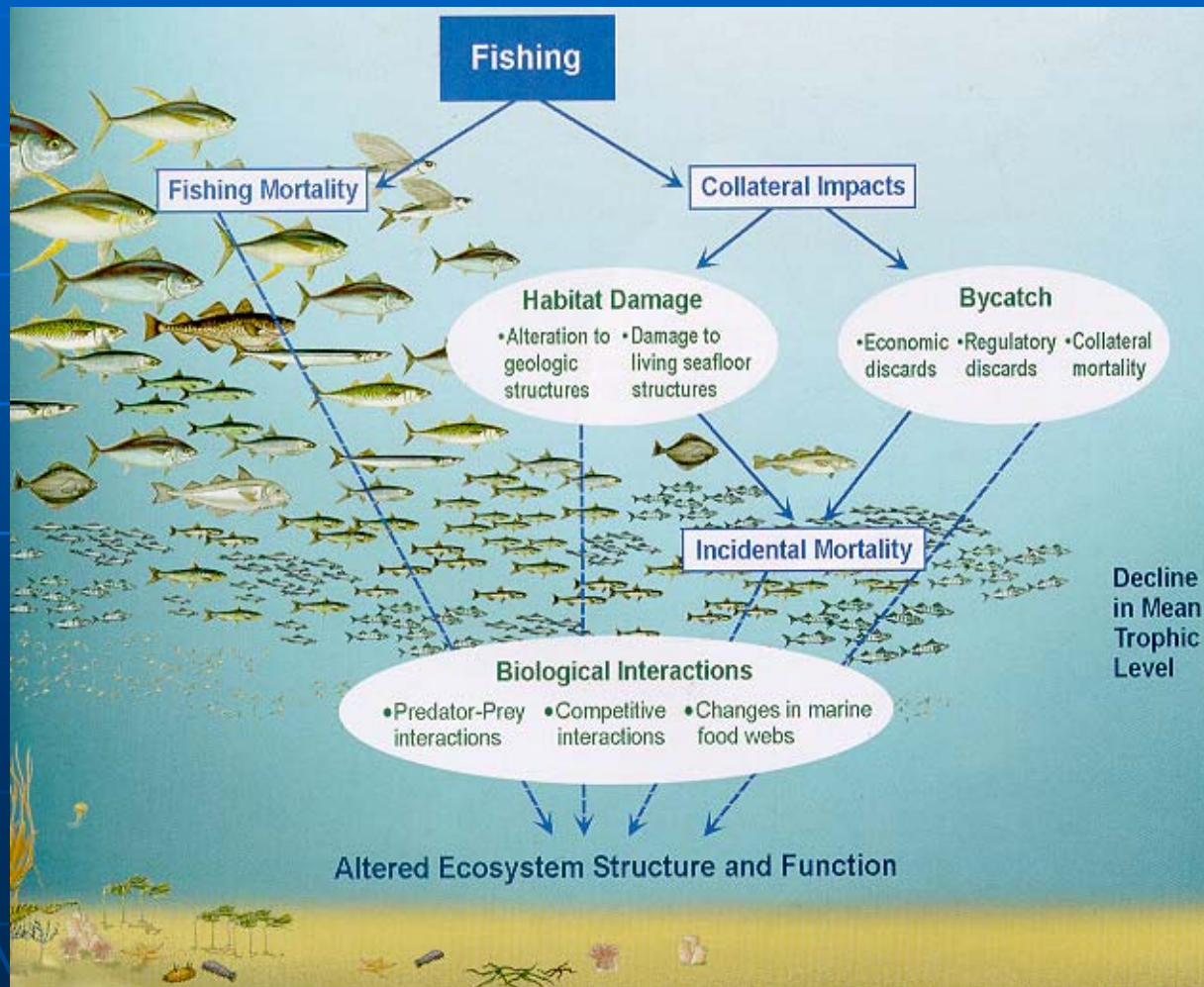
Rapid decline of large predatory fishes



Myers and Worm. 2003.
Nature



Direct and Indirect Effects of Fishing



Magnitude of Bycatch

Finfish

- ~7.3 million tons of fish per year (Kelleher 2005)

Sharks, Rays, and Skates

- ~ 90 million in the world's fisheries (Bonfil 2000)

Marine Mammals

- ~ 650,000 in the world's fisheries (Read et al. 2006)

Loggerhead Turtles

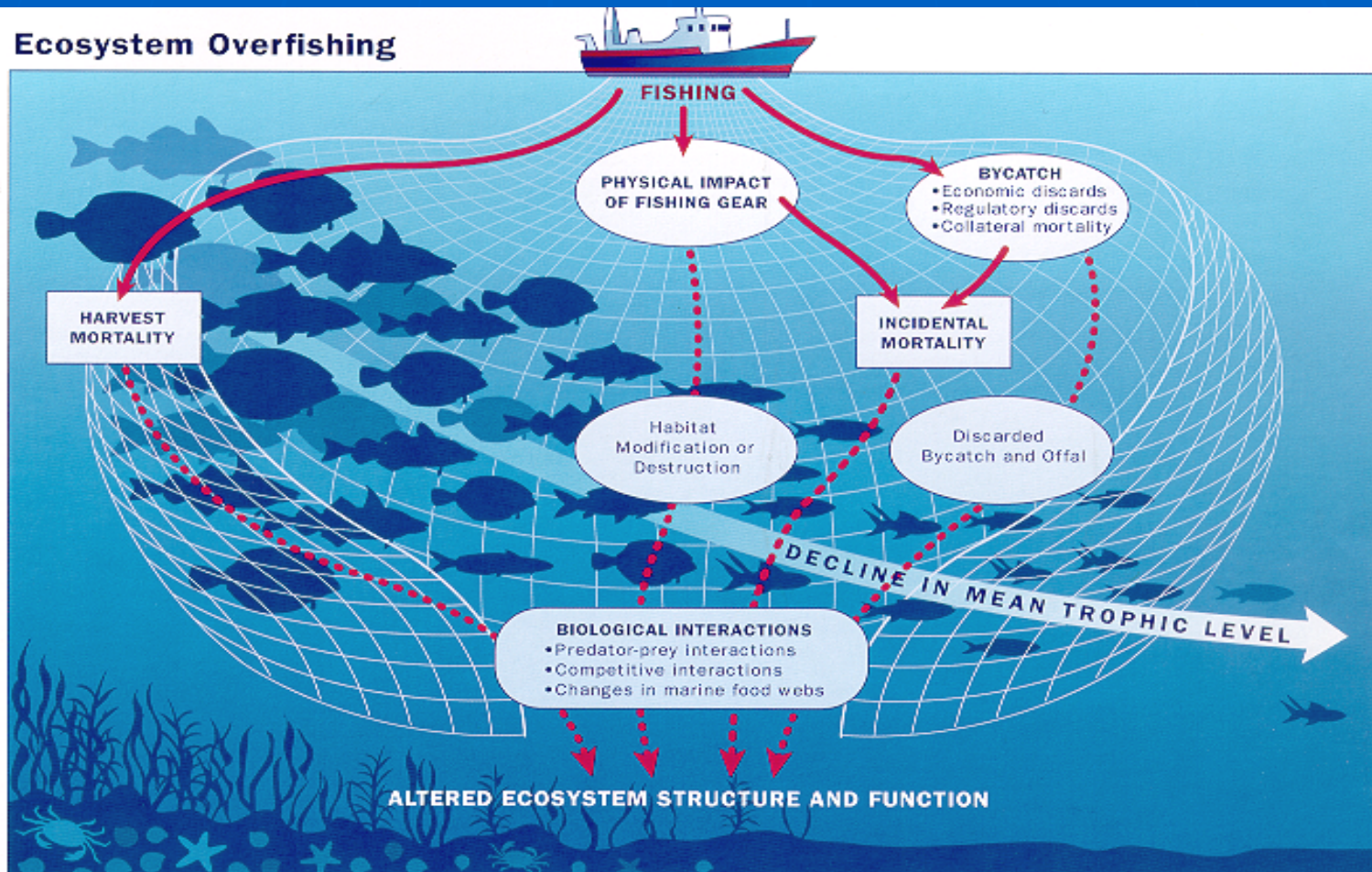
- ~ 200,000 in global pelagic longline fisheries (Lewison et al. 2004)

Seabirds

- >300,000 including 100,000 albatrosses in longlines (Bird Life International 2004)

Ecosystem Effects

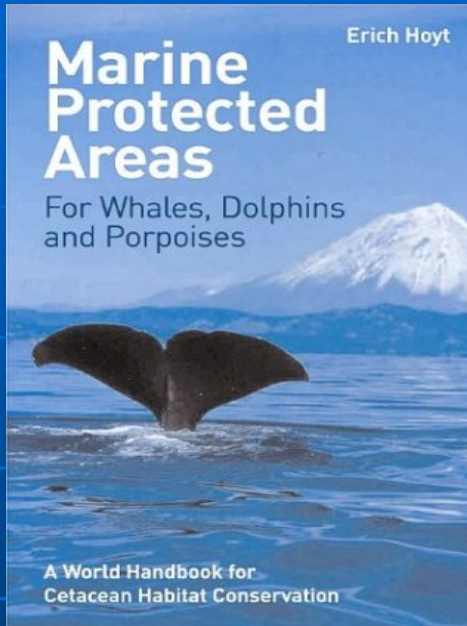
Ecosystem Overfishing



Source: Adapted from Pauly et al., 1998; Goñi, 2000.

Art: John Michael Yarsun

Solutions - the Conservation Toolkit



- MPAs & Time-Area Restrictions
- Changes to Fishing Practices or Gear
- Bycatch Quotas
- Market Demand

BEST CHOICES	GOOD ALTERNATIVES	AVOID
Abalone (farmed) Catfish (US farmed) Clams, Mussels, Oysters (farmed) Cod: Pacific (longline-caught from AK)* Crab: Dungeness, Snow (Canada) Halibut: Pacific Lobster: Spiny (US) Pollock (wild-caught from AK)* Rockfish: Black (CA, OR) Sablefish/Black Cod (AK, BC) Salmon (wild-caught from AK)* Sardines Shrimp: Pink (OR) Spot Prawn (BC) Striped Bass (farmed) Sturgeon, Caviar (farmed) Tilapia (US farmed) Trout: Rainbow (farmed) Tuna: Albacore, Bigeye, Yellowfin (troll/pole-caught) White Seabass	Bass/Tra (farmed) Clams, Oysters* (wild-caught) Cod: Pacific (trawl-caught) Crab King (AK), Snow (US, imitation) Dogfish (BC)* Flounders, Soles (Pacific) Lingcod Lobster: American/Maine Mahi mahi/Dolphinfish/Dorado Redfish/Striped Bass (wild-caught from AK, BC)* Sablefish/Black Cod (CA, OR, WA) Salmon (wild-caught from CA, OR, WA) Sanddabs: Pacific Scallops: Bay, Sea Shrimp (US farmed or wild-caught) Spot Prawn (US) Squid Sturgeon (wild-caught from OR, WA) Swordfish (US)* Tuna: Albacore, Bigeye, Yellowfin, (longline-caught)* Tuna: canned light Tuna: canned white/Albacore*	Chilean Seabass/Toothfish* Cod: Atlantic Crab King (imported) Dogfish (US)* Grenadier/Pacific Roughy Lobster: Spiny (Caribbean imported) Monkfish Orange Roughy* Rockfish (trawl-caught)* Salmon (farmed, including Atlantic)* Sharks* Shrimp (imported farmed or wild-caught) Sturgeon*, Caviar (imported wild-caught) Swordfish (imported)* Tuna: Bluefin*

MONTEREY BAY AQUARIUM

Seafood WATCH

West Coast Seafood Guide 2006

AK = Alaska BC = British Columbia
 CA = California OR = Oregon
 WA = Washington US = United States

* Limit consumption due to concerns about mercury or other contaminants. Visit www.seafoodwatch.org
 † Certified as sustainable by the Marine Stewardship Council standard. Visit www.msc.org



Sustainable Seafood

- The Marine Stewardship Council (MSC) is an independent, global, non-profit organization that is harnessing consumer purchasing power to generate change and promote environmentally responsible stewardship.
- The MSC has developed an environmental standard for sustainable and well-managed fisheries that rewards environmentally responsible fishery management and practices. Consumers will be able to choose seafood products which have been independently assessed by MSC.

As of September 2007 there are 857 MSC-labelled seafood products sold in 34 countries worldwide. Over 7% of the world's edible wild-capture fisheries are now certified or in full assessment against the MSC standard.

**How many of the world's fisheries can be certified?
Will that be sufficient to meet peoples' needs?**